

Jihai Zhao

Evanston, IL | jihaizhao2024@u.northwestern.edu | (616)- 227-7199 | [LinkedIn](#) | [Portfolio](#)

EDUCATION

Northwestern University, GPA 3.7/4.0 **Sep. 2023 – Dec. 2024**
M.S. in Robotics *Evanston, IL*

Coursework: *Embedded Systems in Robotics, Robot Manipulation, Lagrangian Dynamics, SLAM, Computer Vision, Machine Learning, Active Learning, Deep Reinforcement Learning*

The Ohio State University, GPA 3.73/4.0 **Sep. 2019 – Jun. 2023**
B.S. with Honors in Mechanical Engineering and Minor in Computer Science *Columbus, OH*

Coursework: *Applied ML, Calculus, Dynamics, Num Methods, Linear Algebra & Differential Equation, Programming C++, Data Structure of C++*

RESEARCH EXPERIENCE

Model Predictive Control for Stable Robotic Autonomy **Jan. – Dec. 2022**

- Implemented and applied Model Predictive Control (MPC) algorithms, with an ideal linear model, nonlinear model, and digital models, to achieve stable control of the bipedal robot.

SELECTED PROJECTS

PORTFOLIO: [HTTPS://JIHAIZHAO.GITHUB.IO/](https://jihaizhao.github.io/)

3D-Bin-Packing **Jan. – Mar. 2024**

- Computer vision was used to find the dimensions and location of the objects.
- Implement First-Fit algorithm to determine the object's location needed to be placed and use MoveIt to control the robot.

Simultaneous Localization and Mapping (SLAM) **Jan. – Mar. 2024**

- Developed a customized C++ package for 2D transformation and kinematics calculations of the differential drive robot.
- Developed a customized simulator for the robot, visualized in Rviz, and implemented Extended-Kalman filter SLAM from scratch.

Coffee Maker **Sep. - Dec. 2023**

- Work in a group of five to develop a collection of ROS2 packages to drive the Franka robot arm to brew a cup of pour-over coffee.
- Computer vision and AprilTags were used to find the location of each object and a custom wrapper package for MoveIt was written in Python to control the robot.

KUKA YouBot Manipulation **Sep. - Dec. 2023**

- Plans a trajectory for the end-effector of a mobile base with four mecanum wheels and a 5R robot arm by using feed-forward control and a PI controller.
- Performs feedback control to drive the youBot to pick up a block at a specified location, carry it to a desired location, and put it down. It was simulated in CoppeliaSim.

Jack in The Box **Sep. - Dec. 2023**

- Used Lagrangian Dynamics and defined 16 constrain of the system. Then apply the impact update law to get symbolic solutions and define a function for the impact update in the simulation loop to get numerical values.
- Successfully develop the dynamic simulation of a jack inside a box.

Robot Arm Pen Grab **Sep. 2023**

- Use the RealSense to measure the 3D location of a purple pen. Align the Depth map to the RGB image and use the pen location as a mask to get the 3D information. Finally, find the centroid of the pen.
- Used the interbotix_xs_toolbox to control the robot to move to the centroid of the pen.

RRT Algorithm **Sep. 2023**

- Implement Rapidly-Exploring Random Tree to create a collision-free path in an arbitrary object

SKILLS

Programming: Python, C++, R, Arduino, MATLAB, Linux, Git

Robotics: ROS2/ROS, TensorFlow, OpenCV, MoveIt, Rviz, Gazebo, SLAM, Computer Vision

Language: Chinese (Native), English (Full Professional Proficiency)